



A SIMULATION TRAINING ON COPPER T380A INSERTION AND REMOVAL AMONG NURSING STUDENTS: AN INTERVENTION TO IMPROVE KNOWLEDGE AND SKILLS PERFORMANCE

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Abstract

The study aimed to assess the effectiveness of simulation training on the insertion and removal of the copper T380A among nursing students. Design: Quasi-experimental one-group pre-test-post-test design was used in the study. Results: The paired "t" value of knowledge was (21.84), and skills permanence was (20.36) at ($p < 0.05$), which indicates that there were significant changes in knowledge and skills performance. The correlation ('r') in the pre-test was ($r = 0.51$). The post-test was ($r = 0.91$) between knowledge and skills performance, indicating a moderate positive correlation. There was no association with demographic variables like age, family income, and sources of knowledge ($p < 0.05$) in both knowledge and skills performance. Conclusion: The results showed that the simulation training improved knowledge and skills performance on the insertion and removal of copper T380A among nursing students.

Keywords: Copper T380A, Knowledge, Nursing Students, Simulation, Skills performance.

INTRODUCTION

The estimated global fertility rate will reach 2.2 live births per woman in 2050 and 1.9 in 2100. Sustainable Development Goal 3 aims to ensure the health and well-being of the population by 2030, and target 3.7 is to ensure universal access to sexual and reproductive health care services. Contraceptive usage is increasing by 55% in 37 countries and 20% in 23 countries. (UN., 2020).¹ Intrauterine Contraceptive Devices (IUCD) is the worldwide accepted contraceptive used in Latin America (4.6%), North America (7.9%), Africa (2.6%), Asia (10.7%), and Oceania (3.7.%) (UN. 2019).²

Richard Richter created the first intrauterine contraceptive device in 1909. Subsequently, Jack Lippes developed the Lippes Loop in the 1960s, which became the most popular and commonly used IUCD in developing countries. There are two types of IUCD usually available: copper (Cu) and hormonal (Levo-norgestrel). Among the copper-based IUCDs, the copper T380A (Cu T380A) is one of the most widely used IUCDs globally and readily available in many countries. The copper T380A is a T-shaped device made of polyethylene and coated with barium sulfate for X-ray imaging to visualize the device's location in the mother's uterus. The length of the device is 3.6 cm, and the width is 3.2 cm. There are small copper bands on each horizontal arm of the T, which ensure that copper is released in the fundus of the uterus. The "vertical stem" is also covered with copper wire. A thin layer of polyethylene (silk thread)

is attached to the bottom of the stem for easy removal. It works primarily by preventing pregnancy, as the copper ion reduces sperm motility and works by altering the uterus and tubal fluid, thereby preventing sperm from reaching the fallopian tubes and fertilizing the egg. The device prevents implantation as it stimulates the foreign body reaction in the endometrium that releases macrophages. The following are the significant indications of copper T380A: Any woman in her reproductive age group (15–49 years) who has borne a child and wants to space or prevent pregnancy, postmenstrual insertion at any time in the cycle after reasonably excluding pregnancy more than six weeks postpartum, provided there is no evidence of infection, women who have lactational amenorrhea after ruling out pregnancy, following the first menstrual period after an induced or spontaneous abortion, and emergency contraception. The potential health risks of copper T380A include uterine perforation, automatic expulsion, heavy menstrual flow, infection, and ectopic pregnancy. The working life of copper T380A is ten years from the date of insertion (GOI, 2007).³

According to a research survey conducted among Salvadoran healthcare providers, a lack of formal training and knowledge about persistent infection rates associated with intrauterine devices (IUDs) may contribute to low IUD placement. As per this survey, healthcare providers are interested in learning about the IUD and sharing the information with their patients (Hohmann HL et al., 2013).⁴

Nirali M Chakraborty et al. (2015) investigated the knowledge of Intra-Uterine Devices (IUD) among 345 auxiliary nurse midwives (ANM) working in Nepal's public sector and discovered that 61.4% knew IUD, implying that healthcare workers require additional training and support to improve their knowledge.⁵

In the Amhara region, public health facilities in Ethiopia observed that only 29.3% of healthcare providers had "good" knowledge, 35.7% trained, and 27.9% were untrained in Post-Partum Intra-Uterine Contraceptive Devices (PP-IUCD) (Abebaw Y et al., 2019).⁶

Reham Refaat Elkhateeb et al. (2020) discovered that the majority of nulliparous women seeking contraception (96.2 %) had a negative perception of the Intra-Uterine Devices (IUD) technique. The study concluded that the primary barriers to IUD usage were women's lack of awareness and physicians' attitudes. Increased use of such an effective and safe procedure would be by physicians trained to improve their experience.⁷

Romy Biswas et al. (2018) assessed intrauterine contraceptive device (IUCD) knowledge and attitudes among Axillary Nurse Midwives (ANM) in India and discovered 57.5% knowledge and 60% attitudes. The study concluded that proper job training and peer group education are required to increase IUCD knowledge and attitudes.⁸

Students have benefited from simulation training since it provides them with a safe environment to learn how to avoid mistakes before interacting with actual patients. Previous studies have shown that small-group process workshops improve medical students' confidence, participation, and performance concerning process skills in introducing Intra-Uterine Contraceptive Devices (IUCD). Simulation has been used successfully by women's health trainees from several disciplines, including midwifery students, nurse practitioners, and family medicine residents. The Pelvic-Sim manikin for intrauterine contraceptive devices (IUCD) training was accepted by 237 (97.2%) nurse practitioners. Furthermore, they reported better comfort with uterine sounds (57.7%) as well as reduced patient pain (72.8%) after the training (Laura E. Dodge et al., 2016).⁹

AIM

The study aimed to assess the pre-test and post-test knowledge and skills performance, evaluate the effectiveness of the simulation training, and find out the association with the demographic variables of age, family income, and sources of knowledge. Further, to find out the relationship between knowledge and skills performance on the insertion and removal of copper T380A among nursing students.

METHODS

Design

A quasi-experimental one-group pre-test-post-test design was used in the study. The study was conducted among nursing students studying at the Savitri Jindal Institute of Nursing, Haryana, India. The simulation on copper T380A was the independent variable, while knowledge and skills performance on copper T380A were the dependent variables. Age, family income, and sources of knowledge were the extraneous variables.

Sample

The samples for this investigation were chosen using a simple random sampling procedure. The table technique was used to determine the sample size, as Krejcie and Morgan (1970) recommended. According to the table method, if the population size is 50, at a 95% confidence interval with a 5% margin of error, 44 samples are required. Due to the dropout rate, 50 samples were included in the investigation. The study inclusion criteria were General Nursing Midwifery (GNM) III-year students and those willing to participate. Those who were not available for data collection were excluded.

Data collection

Based on the literature review, a self-structured questionnaire was developed in English, consisting of the following: Part I consist of demographic variables such as age, family income, and sources of knowledge. Parts II consists of 30 self-structured knowledge questionnaires (Multiple Choice Questions). The Questionnaire includes the topics of the anatomy of the uterus, different types of IUCD, characteristics of copper T380A, advantages of IUCD, limitations, contraindications, side effects, potential health risks, indications, client assessment, preparation, equipment, and the correct answer score (01) and the wrong answer score (00). After converting the level of knowledge score to a percentage, it was divided into three categories: likely inadequate (50), moderately adequate (51-75), and adequate (> 76). Part III consists of a 30-step checklist on skills performance in inserting and removing copper T380A with poor (00), good (01), and excellent (02) scores. The skills performance score were divided into three categories: poor (50), good (51-75), and excellent (> 76).

Validity and Reliability

The content validity of the tool was validated by experts and finalized based on the modifications and recommendations. Furthermore, the reliability of the knowledge tool was checked by the Split-Half method by applying Karl Pearson's correlation coefficient formula, and to overcome the underestimation of reliability, used the Spearman-Brown Prophecy formula, and the results showed excellent reliability for knowledge ($r = 0.99$) and the skills performance ($r = 0.92$).

Description of the intervention

The data collection was carried out from 04/12/2021 to 31/12/2021 after permission from the Director of Savitri Jindal Institute of Nursing, Haryana, India. Explained the aim and procedure to the nursing students and obtained the informed consent of each student before the data collection began. The researcher distributed a self-structured questionnaire on the first day, instructed the students to fill in the demographic variables and assessed the pre-test level of knowledge with 30 multiple-choice questions for 45 minutes in the lecture hall. They were asked to respond honestly and completely. The researcher reminded them that their answers would be kept confidential. Next, assess the skills performance with a checklist consisting of 30 items on copper T380A insertion and removal steps individually for 30 minutes. After the pre-test, the researcher presented the PowerPoint of the copper T380A for one hour. The followings topics have covered the anatomy of the uterus, different types of IUCD, characteristics of the copper T380A, advantages of IUCD, limitations, contraindications, side effects, potential health risks, indications, client assessment, preparation, equipment and supplies, the timing of the insertion, and place of insertion. The total number of students was divided into 05 groups, each consisting of 10 students. The researcher conducted the simulation training for 45 minutes on the insertion and removal of the copper T380A with pelvi-sim manikins in the midwifery laboratory. 7th day, the researcher collected the post-test level of knowledge for 30 minutes in the lecture hall and the skills performance, which was assessed individually with a checklist for 30 minutes.

Pilot study

A pilot study was conducted among five nursing students who met the inclusion criteria to test the feasibility and reliability of the tool. The data obtained from the pilot study helped to modify the tools. The nursing students who participated in the pilot study were not included in the study sample.

DATA ANALYSIS

Frequency and percentage were used as demographic variables. The knowledge and skills performance level was calculated by the mean and standard deviation (SD). Found the effectiveness of knowledge and skills performance on the insertion and removal of copper T380A using paired "t" test ($p < 0.05$). Chi-square analysis determined the association knowledge and skills performance with their selected demographic variables. Pearson's correlation coefficient ('r') was analyzed to determine the relationship between knowledge and skills performance.

RESULTS

Demographic variables by age; the majority of them, 42 (84%), belonged to the age group of 18–22 years, 7 (14%) were in the 23-27 age range, and 1 (02%) was in the 28-32 age range, although none of them were > 33 years old. Concerning family income, the majority of them were 20 (40%) under Rs 10001-15000, 12 (24%) of them were Rs 5001-10000, as well as 9 (18%) of them were Rs 15001-20000, and 9 (18%) of them were under Rs > 20000 . concerning the sources of knowledge received, the majority of the 35 (70%) from teachers, another 8 (16%) from the mass media, and 7 (14%) from family and friends.

Regarding level of knowledge the majority of them, 43 (86%), had inadequate knowledge, 5 (12%) had moderately adequate knowledge, and 2 (04%) had adequate knowledge in the pre-test. After the simulation training, the majority of the 36 (72%) had adequate knowledge, 12 (24%) had moderately adequate knowledge, and 2 (4%) had inadequate knowledge as assessed by the post-test. Concerning the pre-test score of skills performance, the majority of the 40 (80%) had poor skills, 7 (14%) had good skills, and 3 (06%) had excellent skills. After the simulation training, most of them 34 (68%) had excellent skills. 14 (28%) had good skills, and 2 (04%) had poor skills measured by post-test.

Regarding paired "t" value of pre-test and post-test knowledge ($t_{(49)} = 21.84$) and pre-test and post-test skills performance ($t_{(49)} = 20.36$) which indicates that there were significant changes in the knowledge and skills performance at ($p < 0.05$). The study concludes that the simulation training was significant in gaining knowledge and skills performance on the insertion and removal of copper T380A among nursing students.

The obtained chi-square values with knowledge in terms of age (1.17), family income (2.58), and sources of knowledge (9.24) were not significant ($p < 0.05$).

The obtained chi-square values with skill performance in terms age (0.23), family income (1.31), and source of knowledge (2.68) were not significant ($p < 0.05$).

The pre-test correlation ($r = 0.51$) and post-test correlation ($r = 0.91$) revealed a moderately positive correlation between nursing students' knowledge and skills performance on the insertion and removal of copper T380A.

DISCUSSION

The purpose of the study was to assess the pre and post-test knowledge and skills performance, evaluate the effectiveness of the simulation training, and find out the association with the demographic variables of age, family income, and sources of knowledge. Furthermore, it examined the relationship between knowledge and skills performance on the insertion and removal of copper T380A among nursing students.

The study's findings supported by Deborah Bartz et al. (2016) conducted a prospective cohort study on intrauterine contraceptive insertion and removal: an intervention to increase comfort, skills, and attitudes among 45 medical students. After the intervention, the Intra-Uterine Contraception (IUC) related knowledge scores increased by a median of 3 out of 10 points ($p = 0.01$), and the students were considerably more comfortable counselling patients about IUC inserting.¹⁰

Carlie Field et al. (2019) supported the study's findings, who examined knowledge-based questions after the simulation among preclinical medical students. Pre-survey knowledge of intrauterine devices (IUD) increased from 51% ($n = 70$) to 87% ($n = 119$) on post-surveys, and also the post-surveys stated that students felt comfortable while counselling the patients.¹¹

The study findings were endorsed by Kiemtore S et al. (2020) among 38 medical students at Salgado's Department of Obstetrics and Gynecology. The training increased the average knowledge score from 48.2 % to 93.0 % ($p = 0.001$). The average skills score rose from 34.4 to 92.8% ($p = 0.001$).¹²

Amerjee et al. (2021) conducted a similar study at Aga Khan University Hospital in Karachi to compare the knowledge, procedural, communication skills, and learner satisfaction among (90) medical students regarding intrauterine contraceptive device (IUCD) insertion before and after introducing hybrid simulation training (HST). Organized the IUCD interactive session, literature distribution, and a video clip for the students. Students were pre-tested using a simulated patient (SP) and a manikin at the same time on an objectively structured clinical examination station (IUCD insertion). A manikin practice session and a post-test on the same Objective Structured Clinical Examination (OSCE) station were conducted. 73 students out of 90 completed the pre/post-test and evaluation questionnaires. Significant differences in pre and post-simulation mean scores were found for all clinical skills: history taking (5.1 pre-test, 8.8 post-test, $p = 0.0005$); counselling (40.11 pre-test, 57.85 post-test, $p = 0.0005$); procedural (15.16 pre-test, 49.09 post-test, $p = 0.0005$), and total scores (60 pre-test, 115.6 post-test, $p = 0.0005$).¹³

CONCLUSION

The results showed that the simulation training improved knowledge and skills performance on the insertion and removal of copper T380A among nursing students, which will help the students become more confident in clinical settings. The study recommended that the faculty play a significant role in developing a checklist (or) protocols to educate the nursing students on the simulation training of insertion and removal of copper T380A. A similar study can also be conducted on a large scale among nursing students to validate the findings for better generalization.

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